1117-43 **Can Myocardial Contrast Echocardiography, Using Triggered Replenishment Imaging, Be an Alternate to Single-Photon Emission Computed Tomography in Predicting Significant Coronary Artery Disease?**

Xiao-Fang Xu, Jeanne Drinko, Jianbao Li, Christine Whitman, Kathy Morris, Neil L. Greenberg, James D. Thomas, The Cleveland Clinic Foundation, Cleveland, OH

Background: Triggered Replenishment Imaging (TRI) is a novel MCE technology. Myocardial perfusion by Sonazoid-enhanced TRI was compared with SPECT during dipyridamole stress test. Their accuracy in predicting significant coronary stenosis was assessed. **Methods** 21patients (62±12 yrs old; 17m), with suspected coronary disease and no history of infarction, underwent both MCE and SPECT study during dipyridamole stress test with angiographic confirmation. 3 apical views were obtained by TRI (high MI bubble destruction, intermediate MI systolic-triggered harmonic imaging every heartbeat, with Sonazoid infusio(0.01ul/kg/min). Myocardial perfusion was graded as normal, reversible, and fixed defect in 16segments. Coronary circulation was divided into two territories, LAD and RCA/LCX. Agreement between 2 independent readers and between two methods was determined by Kappa's coefficient of concordance (κ). Diagnostic value in predicting >50% stenosis was ascertained. **Results**: 18% (60/336) segments were not assessable due to artifacts. Agreement between two readers was 97% (κ = 0.91). Overall concordance between TRI and SPECT was 81% (κ = 0.45) for normal *vs* abnormal perfusion. Table showes the diagnostic accuracy of TRI *vs* SPECT in predicting significant coronary stenosis (21pts; 42 territories).

	TRI	SPECT
Sensitivity	81%	50%
Specificity	85%	81%
Positive predicted value	76%	62%
Negative predicted value	88%	72%

Conclusions: MCE pharmacological stress, using TRI and Sonazoid infusion, can detect coronary stenosis. The diagnostic value appears to be comparable to or better than SPECT. Large trials are needed.

1117-44 **Combination of Rapid Heart-Type Fatty Acid Binding Protein and Wall Motion Analysis Using Echocardiography at Emergency Room Improves an Early Diagnostic Value of Acute Myocardial Infarction**

Eiichi Nagashima, Masako Okada, Takahiro Ota, Eriko Murata, Kenji Shimeno, Keiji Nagae, Shiro Yanagi, Kazuyoshi Hirota, Junichi Yoshikawa, Fuchu Hospital, Osaka, Japan, Osaka City University, Osaka, Japan

Background: For the early diagnosis of acute myocardial infarction (AMI) , whole blood rapid assay for troponin T (TnT) has a temporal limitation within 3 hours after the onset of AMI because of the slow release kinetics. Newly developed heart-type fatty acid binding protein (FABP) has been reported to be a sensitive cytosolic marker in the superacute phase following myocardial damage. Wall motion abnormality by TTE can be detected in the superacute phase of AMI. The aims of this study were to evaluate the early diagnostic value of FABP and compare the diagnostic accuracy for AMI between FABP, TnT and combination use of FABP and emergent transthoracic echocardiography (TTE) .
Methods: Thirty-seven consecutive patients (mean 68.1 y.o.,13 male, 24 female) who visited emergency room (ER) with suspicious of acute coronary syndrome because of chest pain, ECG abnormality were enrolled. Both FABP and TnT were tested. The detection of wall motion abnormality by TTE at ER was considered positive for AMI. Myocardial enzyme (CPK, CKMB) was measured simultaneously. Twenty-one of 37 patients of suspected acute coronary syndrome underwent coronary angiography. **Results:** Twenty-four of 37 patients had final diagnosis of acute coronary syndrome (19 AMI, 5 unstable angina) and 13 diagnosed non-cardiac disease. Percutaneous coronary intervention was performed to 19, coronary artery bypass graft surgery to 5 patients. Using FABP alone for the diagnosis of AMI, sensitivity was 85%, specificity 56%, and diagnostic accuracy was 68%. TnT has sensitivity 57%, specificity 89%, and accuracy 79%. Combination use of FABP and emergent TTE yields sensitivity 89%, specificity 83%, and accuracy 85%. CPK and CKMB showed abnormal level 5.1 hours (mean) after onset of AMI. **Conclusions:** Rapid assay of FABP shows positive, less than 2 hours after onset of AMI, and is more sensitive marker than TnT for the early diagnosis of AMI, however, specificity is low. This study indicates that combination use of FABP and emergent TTE, improving the sensitivity and specificity remarkably, is a simple and accurate diagnostic method for the emergency triage of AMI, expecting the time to percutaneous coronary intervention to be reduced.

POSTER SESSION

1118 New Magnetic Resonance Imaging Techniques

Monday, March 31, 2003, Noon-2:00 p.m.
McCormick Place, Hall A
Presentation Hour: 1:00 p.m.-2:00 p.m.

1118-31 **Magnetocardiography as a Sensitive Method for Detecting a Coronary Stenosis of the Left Descending Artery**

Daniela M. Katz, Christoph Naber, Marc A. Katz, Ilya Chaikowski, Heinrich Wieneke, Raimund Erbel, University Clinic of Essen, Essen, Germany

Background: Magnetocardiography (MCG) is a non-invasive investigation method of the native cardiac magnetic field. Previous studies indicate MCG to be a sensitive method for evaluation of coronary artery disease. The aim of our study was the detection of a significant stenosis of the left descending artery (LAD) through a new improved classification of the MCG-maps.
Methods: 35 normals (45±10 years) were compared to 35 patients (56±11 years) with an angiographic significant LAD stenosis (≥70%) and with a good left ventricular function and no history of myocardial infarction. The coronary angiography was performed with a four channel system with 36 data points in a grid of 20 x 20 cm in an unshielded room. Based on 15 magnetic field maps gained at intervals of 12 ms before and after maximum ventricular repolarisation we defined an index of magnetic field distribution which was classified into 5 categories (0 to 4) with 0 being normal.
Results: The indices differed significantly between groups (1.11±0.14 vs. 2.85±0.68 in normal controls vs. Patients with LAD stenosis, p<0.001; Mann-Whitney-Test). Defining "normal" as the mean value in control subjects ± 2SD (i.e. 1.40), we find a sensitivity of 89% and a specificity of 78% to identify a significant LAD-stenosis.
Conclusion: Our MCG-based index seems to be a sensitive method for identification of a significant LAD-stenosis. It is a simple and rapid non-invasive test, which can easily be incorporated into daily clinical practice.

1118-32 **Pericardial Effusion or Epicardial Fat? Improved Discrimination With Phase-Sensitive Inversion Recovery Magnetic Resonance Imaging**

Christopher K. Dyke, Peter Kellman, Anthony H. Aletras, Andrew E. Arai, NHLBI/National Institutes of Health, Bethesda, MD

Introduction: Pericardial effusion is a common clinical finding with potentially important implications but is easily missed using SSFP (FISP) cine and gadolinium enhanced magnitude-reconstructed inversion recovery (Mag-IR) images due to poor contrast vs. epicardial fat despite markedly different T1. Phase-sensitive inversion recovery (PS-IR) has been validated for infarct imaging and has a number of benefits. We proposed that PS-IR would better differentiate pericardial effusion from epicardial fat because PS-IR maintains the polarity of short and long T1 tissues. **Methods** From 392 consecutive patient reports, 53 patients had a pericardial effusion (trace=28, mild=14, moderate=8, severe=3). The signal intensity of epicardial fat and pericardial effusion was measured in 14 patients imaged with all methods (SSFP, Mag-IR, PS-IR) who had more than a trace effusion. **Results**: The signal intensity of fat and effusion were similar using SSFP (p=NS) or Mag-IR (p=NS). Using PS-IR, the fat is bright (positive) but the effusion is dark (negative) (p<0.001). The PS-IR image demonstrates a dark pericardial effusion (arrows), bright epicardial fat, and dark normal myocardium. Qualitatively, trace effusions showed the same findings. **Conclusion**: While the most commonly used cardiac MRI parameters have poor contrast between pericardial effusion and epicardial fat, PS-IR reconstruction provides high quality delayed hyperenhancement images and detects effusion without lengthening the typical exam.

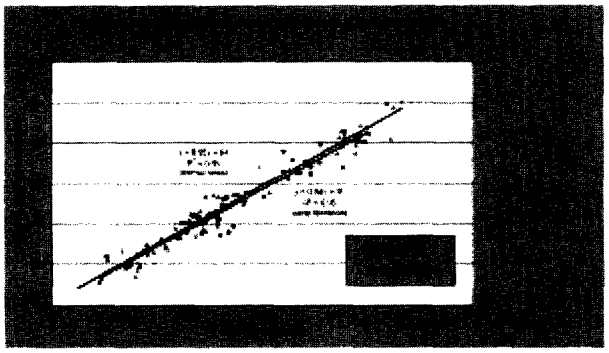
1118-33 **Comparison of Real-Time Imaging Cardiac Magnetic Resonance for Left Ventricular Volumes With Conventional Imaging in Patients With Atrial Fibrillation: Is Real-Time Required?**

Salvatore P. Costa, Susan B. Yeon, Kraig V. Kissinger, Michael C. Chuang, Warren J. Manning, Boston Medical Center, Boston, MA, Beth Israel Deaconess Medical Center, Boston, MA

Background: Conventional cardiac magnetic resonance produces images of a complete cardiac cycle by collecting data from multiple heart beats during a single breath hold. Due to R-R variability, we hypothesized that conventional images would therefore be sub optimal for patients with atrial fibrillation and sought to compare real-time with conventional R-wave gated acquisitions.

Methods: Twenty subjects (6 Afib, 4 Aflutter with variable block and 10 patients with sinus rhythm) were recruited. All subjects had conventional ECG-gated balanced FFE imaging in the mid-ventricle short axis, 4-chamber, and 2-chamber views as well as 10-beats of continuous real-time imaging in the same orientations. End-systolic and end-diastolic LV areas for the conventional and real-time (average of 10 consecutive beats) data sets were measured. **Results:** A very strong correlation exists between the conventional and real-time methods for LV areas for both sinus rhythm (r^2 = 0.95) and AF (r^2 = 0.94) subjects (figure). This relationship persists when end-systole (r^2 = 0.87, 0.87 respectively) and end-diastole (r^2 = 0.93, 0.94 respectively) are evaluated separately. However, the correlation is only modest for LV area change (diastole - systole) in both groups (r^2 = 0.6).

Conclusion: For patients with atrial fibrillation, conventional balanced FFE acquisitions compare favorably to real-time for determining LV cavity size. However, LV area change does not correlate as well which may be due to differences in temporal resolution.



1118-34 **Assessment of the 3-D Flow Pattern In the Sinuses of Valsalva**

John-Peder E. Kvitting, Tino Ebbers, Lars Wigström, Jan Engvall, Ann F. Bolger, Christian L. Olin, Linköping University, Linköping, Sweden, University of California at San Francisco, San Francisco, CA

Background:
The sinuses of Valsalva have been postulated to be important in the function of the aortic valve. The vortices formed within the sinuses have been proposed to adapt the aortic valve for early closure and improve coronary blood flow. Albeit, the function of the aortic sinuses remains largely unstudied in man.

Methods:
Using a time-resolved 3D phase contrast magnetic resonance imaging (MRI) technique blood velocity data was acquired in 6 male volunteers, mean age 34 ± 14 (range, 25-61). The velocity data was transferred to a visualization program where streamlines were generated to visualize the instantaneous flow field in systole. The aortic flow curve was obtained by extracting velocity data from a region within the aortic lumen.

Results:
Vortex formation was seen in all three aortic sinuses, but was only present at the down stroke of the aortic flow curve. Initially the vortices increase in size, and move towards each other with the closure of the aortic valve. In late systole the vortices become smaller and rotate with lower velocities. In the figure, image 1 corresponds to peak systole, and 2-4 to 90,120 and 150 ms later.

Conclusion:
In our normal volunteer data the vortices are seen being formed in late systole, as the aortic flow decelerates. These are the first 3D, non-invasive images of the flow patterns within the sinuses of Valsalva in man.

ORAL CONTRIBUTIONS

826 Advances in Echocardiography: New Tools and New Applications

Monday, March 31, 2003, 2:00 p.m.-3:30 p.m.
McCormick Place, Room S101

2:00 p.m.

826-1 **Intracardiac Echocardiographic Guidance of Transcatheter Closure of Atrial Septal Defects and Patent Foramen Ovale: Comparison With Transesophageal Echocardiography and Cine Fluoroscopy**

Qi-Ling Cao Ziyad M. Hijazi, Peter Koenig, Mei Jin, Joel Sims, David J. Waight, Mary Heitschmidt, Roberto M. Lang, University of Chicago, Chicago, IL

Background:Intracardiac echocardiography (ICE) can provide similar anatomical views to TEE that may obviate the need for anesthesia during device closure.
Methods: 153 patients (104 female) with secundum ASD(n=109) or PFO associated with a stroke/transient ischemic attack (n=44) underwent transcatheter device closure guided by sequential TEE and ICE (Group A, n= 9) or ICE alone (Group B, n=144). The mean age of patients was 39 yr. and the mean weight was 64.3 kg. Results: Both imaging techniques provided similar views of the atrial septum, the defects and the various stages of device deployment. However, due to the proximity of the left atrium to the esophagus, the images obtained by ICE were more helpful and informative than those obtained by TEE. In group A, there was no difference in the mean size of the defect as measured by TEE compared with that measured by ICE: mean of 21.2 mm (range 14-27 mm) by TEE compared with a mean of 19.7 mm (range 14-26.2 mm) by ICE. Furthermore, there was no difference in the size of the balloon stretched diameter of the defect as measured by TEE compared with ICE: mean of 26.6 mm (range 16-38 mm) by TEE compared with a mean of 26.4 mm (range 16-35.1 mm) by ICE. Both TEE and ICE correlated very well for the measured 2-D defect diameter and the balloon stretched diameter (r=0.94 and 0.98 respectively). In group B, the mean size of defects as measured by ICE alone was 13.3 mm (range 2-36). ICE measurement of the balloon stretched diameter correlated well with cine angiography: mean of 20.4 mm (range 3-36 mm) by ICE compared with a mean of 21.5 mm (range 3.5-38 mm) by cine fluoroscopy, r=0.98. All patients had successful device placement (guided either by TEE and ICE, or ICE alone). The mean device size was 22 mm (range 5-38 mm). One thirty five patients had immediate complete closure and 18 patients had small residual shunt. There were no complications encountered during the procedure related to the use of ICE.
Conclusion: ICE provides unique images of the atrial communications and similar measurements to those obtained by TEE and cine fluoroscopy. ICE should replace TEE as a guiding imaging tool for ASD and PFO device closure, thus eliminate the need of general anesthesia.

2:15 p.m.

826-2 **Four-Dimensional Surface-Tracking of Contrast-Enhanced Transthoracic Biplane Echocardiograms: A New Tool for Quantitative Assessment of Left Ventricular Function**

Javier Bermejo, Roberto M. Lang, Rodolfo Odreman, Miguel Mulet, James Saunders, Lynn Weinert, Lissa Sugeng, Mar Moreno, Miguel A. Garcia-Fernandez, Hospital Gregorio Maranon, Madrid, Spain, University of Chicago, Chicago, IL

Objective tools for assessing LV volumes and endocardial motion are limited to 2D echocardiography. We evaluated the accuracy of quantitative measurements obtained from 4D reconstructions using a prototype harmonic bi-plane transducer (Philips). **Methods.** 12 patients with a wide-range of LV volumes were studied. Harmonic imaging during contrast infusion included 19 planes (every 10°), which were scanned sequentially from a fixed transducer position. In each plane, the endocardial border was tracked throughout the cardiac cycle using a custom-designed, semi-automatic algorithm. Endocardial surface was then rendered for all frames and visually verified by superimposing the fitted surface on the original images (**figure**). Instantaneous volumes were compared to those obtained from acoustic quantification (AQ) and to manually-traced Simpson-derived end-systolic (ES) and end-diastolic (ED) volumes. **Results:** 83% of datasets were suitable for surface tracking. Although 4D instantaneous volumes correlated highly with AQ-derived values (n= 271 measurements; $r_{intraclass}$=0.96), AQ volumes were 20% smaller. Agreement of 4D with manually-traced volumes was excellent for ES and ED volumes (r_{ic}=0.93 and 0.97; bias 13 and 3%, respectively) and EF (r_{ic}=0.76; absolute bias 10%). Accuracy of AQ-derived EF was worse (r_{ic}=0.58; absolute bias